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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/681,431	04/04/2001	Radislav Alexandrovich Potyrailo	RD-27767	4767
6147	7590	05/05/2004	EXAMINER	
GENERAL ELECTRIC COMPANY GLOBAL RESEARCH PATENT DOCKET RM. BLDG. K1-4A59 SCHENECTADY, NY 12301-0008			SINES, BRIAN J	
			ART UNIT	PAPER NUMBER
			1743	

DATE MAILED: 05/05/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

### Application No.

09/681,431

### Applicant(s)

POTYRAILO, RADISLAV  
ALEXANDROVICH

### Examiner

Brian J. Sines

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 16 March 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-26 and 28-49 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-26 and 28-49 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 3/16/2004.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

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## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

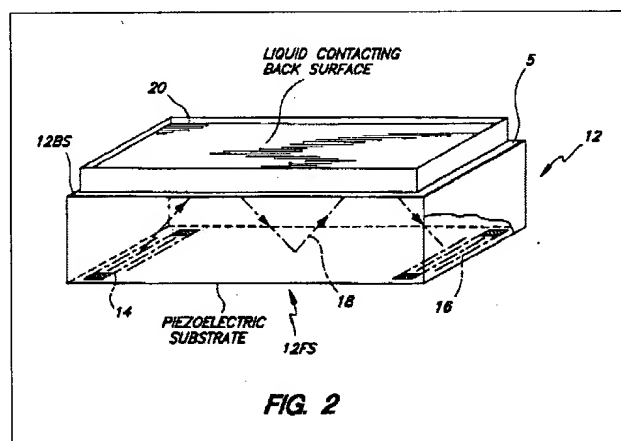
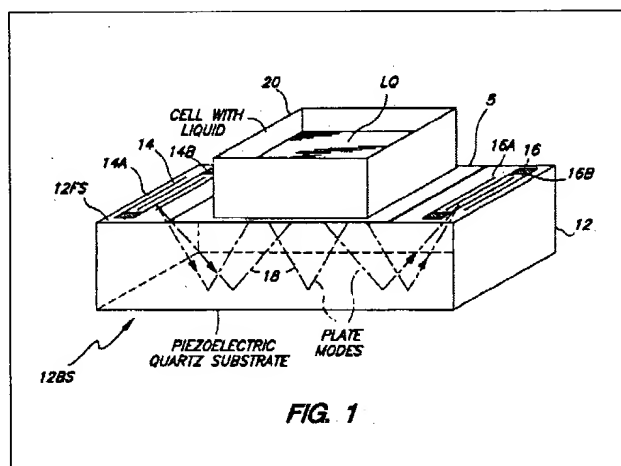
The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

1. Claims 1 – 3, 5 – 7, 10 – 17, 20 – 24, 28 – 30, 32 – 35 and 37 – 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Martin et al. (U.S. Pat. No. 5,117,146 A) in view of Mansky (U.S. Pat. No. 6,553,318 B2). Regarding claims 1, 24, 28, 35, 40 and 43, Martin et al. teach a screening system for evaluating chemical or corrosion resistance using an acoustic wave sensor (see Abstract & col. 6, lines 3 – 6). As shown in figures 1 and 2, Martin et al. teach that a material in the form of a thin film (5) is deposited on the top surface of the substrate (12) of the surface acoustic wave sensor. A chemical (liquid, LQ), which is placed in cell (20), is in direct contact with the surface of the thin film of material (5). Martin et al. teach that the surface acoustic wave sensor detects changes in the characteristics of the thin film due to the adsorption, absorption, deposition, removal, or desorption of material, or changes in the mechanical

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properties of the thin film due to the exposure of the thin film to the liquid (see col. 2, lines 40 – 68; col. 3, lines 17 – 68; col. 4, lines 1 – 63; col. 5, lines 28 – 66 & col. 6, lines 3 – 56). Martin et al. do further teach measuring methods and means (see col. 4, lines 20 – 51). Martin et al. explicitly teach that the disclosed apparatus can be used to measure the mass and mechanical properties of a material present upon the sensor surface (see col. 5, lines 28 – 34).



However, Martin et al. is silent to the specific teaching of providing a screening system comprising a plurality of acoustic wave sensor devices for screening a plurality materials for chemical or corrosion resistance. However, Mansky does teach an array-based system for rapid materials characterization using a plurality of acoustic wave sensors (see col. 37, lines 3 – 67).

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Mansky does teach that advances in combinatorial materials science produce libraries containing a vast number of member chemical compounds, which need to be screened for desired performance characteristics and material properties (see col. 1, lines 6 – 67 & col. 2, lines 1 – 44). It is well known in the art that screening systems use sensor apparatus comprising a plurality of sensor devices, as is evidenced by Mansky (see MPEP § 2144.03). In addition, the Courts have held that the prior art can be modified or combined to reject claims as *prima facie* obvious as long as there is a reasonable expectation of success. See *In re Merck & Co., Inc.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986) (see MPEP § 2143.02). Furthermore, the Courts have held that the mere duplication of parts without any new or unexpected results, is within the ambit of one of ordinary skill in the art. See *In re Harza*, 124 USPQ 378 (CCPA 1960) (see MPEP § 2144.04). Consequently, since both Martin et al. and Mansky teach the use of acoustic wave devices in measuring various mechanical and chemical properties of materials, and that the materials tested are positioned or coated on the sensor surfaces, a person of ordinary skill in the art would accordingly have had a reasonable expectation of success in modifying the system of Mansky to incorporate the testing capability taught by Martin et al., in order to facilitate the effective testing for chemical corrosion resistance (see MPEP § 2143.02). Therefore, it would have been obvious to one of ordinary skill in the art to provide a screening system for evaluating a plurality of materials for chemical or corrosion resistance using an acoustic wave-based sensing system, as taught by Martin et al., in an array-based configuration, as taught by Mansky. Regarding claim 2, Martin et al. teach that the measured acoustic wave properties result from changes in sensor surface conditions comprising changes in the characteristics of the thin film material, which correlate to a mass of dissolved or removed thin

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film material (col. 4, lines 20 – 29). Regarding claim 3, the mass of dissolved material is in the range of about  $1 \times 10^{-15}$  g to about  $1 \times 10^{-3}$  g. For example, as shown in figures 1 and 2, the single quartz crystal substrate used in the preferred embodiment has a rectangular configuration having the following dimensions: length (l) = 11.4 mm (1.14 cm) & width (w) = 7.6 mm (0.76 mm) (see col. 4, lines 52 – 56). Hence, the top surface area of the quartz crystal is:  $l \times w = 1.14 \text{ cm} \times 0.76 \text{ cm} = 0.8664 \text{ cm}^2$ . Martin et al. further teach that to demonstrate the monitoring of an etching process, the dissolution of a 4,200 Å ( $4.2 \times 10^{-5}$  cm) thick aluminum film in a 0.3 % NaOH solution was followed to completion (see col. 6, lines 49 – 56). Assuming that the same quartz crystal is being used as described previously in the preferred embodiment and, for simplicity, that the aluminum film is pure, elemental aluminum and coats the entire top surface area of the quartz crystal, an estimate of the mass of dissolved material can then be made from the teachings of Martin et al. For elemental aluminum, the density ( $\rho$ ) at 25 °C is reported to be  $2.70 \text{ g/cm}^3$  by the CRC Handbook of Chemistry and Physics (3<sup>rd</sup> Electronic Edition). The volume (V) of dissolved or removed aluminum is equivalent to the top surface area of the quartz crystal multiplied by the thickness of the aluminum film removed:  $V = 0.8664 \text{ cm}^2 \times 4.2 \times 10^{-5} \text{ cm} = 3.638 \times 10^{-5} \text{ cm}^3$ . The mass of dissolved material (removed aluminum) is  $\rho \times V = 2.70 \text{ g/cm}^3 \times 3.638 \times 10^{-5} \text{ cm}^3 = \underline{9.82 \times 10^{-5} \text{ g}}$ , which is between  $1 \times 10^{-15}$  g and  $1 \times 10^{-3}$  g. Regarding claim 5, Martin et al. teach that the acoustic wave device is a two-port device (see col. 4, lines 12 – 19). Regarding claim 6, Martin et al. teach that the acoustic wave device is a piezoelectric device (see col. 7, lines 1 – 5). Regarding claim 7, Martin et al. teach the use of an acoustic plate mode (APM) device (see col. 2, line 66 – col. 3, line 6). Regarding claim 10, Martin et al. teach that the acoustic wave property is acoustic wave velocity and attenuation (see col. 3, lines 17 –

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36). Regarding claims 11 and 20, Martin et al. teach the use of a frequency counter (see col. 4, lines 45 – 51). Regarding claim 12, Martin et al. teach that the mass of material under study, such as for the aluminum film as discussed above, is approximately  $9.82 \times 10^{-5}$  g, which is between  $1 \times 10^{-12}$  g and 1 g. Regarding claims 13 and 21 – 23, Martin et al. teach that the acoustic wave property change is followed with respect to the time exposure of the chemical to the thin film material (see col. 6, lines 49 – 56). Furthermore, regarding claims 21 – 23, the measured acoustic wave property would differ from the initial and the subsequent measurements as material is dissolved from the surface of the substrate. Furthermore, regarding claims 23, 33, 34 and 37, the acoustic property measurements of the substrate would be a function of a mass of absorbed material or chemical, since the device is sensitive to the mass loading and mechanical properties of the material present upon the sensor surface (see Martin et al., col. 5, lines 11 – 66). Regarding claims 14 – 16 and 38, Martin et al. teach that the frequency shift in a time period of approximately 4 minutes was monitored during the demonstration of an etching process (see col. 6, lines 49 – 56). Regarding claim 17, Mansky teaches that the disclosed screening system and method may be employed with polymers. Therefore, it would have been obvious to employ the system, as taught by Martin et al. in view of Mansky, in order to provide an effective screening system for combinatorial libraries comprising polymer materials (see col. 17, lines 5 – 52; col. 37, lines 3 – 51). Regarding claims 29 and 30, Martin et al. teach that the system operates with an acoustic synchronous frequency of 158 MHz (see col. 4, lines 63 – 66). Regarding claim 32, Martin et al. teach that the oscillation source comprises an oscillating potential (see col. 4, lines 29 – 51). Regarding claim 39, Mansky teaches the use of a computer in monitoring and controlling the screening system (see col. 2, lines 45 – 67). It would have been obvious to one of

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ordinary skill in the art to further utilize a computer to monitor and control the screening system, as taught by Martin et al. in view of Mansky, in order to effectively monitor and control a complex screening system screening a library containing a multitude of thin film materials. Regarding claims 41 and 42, as discussed above, the change in mass of the aluminum film removed is about  $9.82 \times 10^{-5}$  g, which is in the range of about 1 picogram to about 1 milligram and in the range of about 1 nanogram to about 1 microgram. Regarding claims 44 – 49, Martin et al. in view of Mansky teach all of the structure provided in the claimed method, which merely recites the conventional operation of that structure. It would have been obvious to one of ordinary skill in the art to perform the method recited in the instant claim upon the screening system, as taught by Martin et al. in view of Mansky, as such is the intended operation of that system (see MPEP § 2144.07).

2. Claims 4 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Martin et al. in view of Mansky as applied to claims 1 – 3, 5 – 7, 10 – 17, 20 – 24, 28 – 30, 32 – 35 and 37 – 49 above, and further in view of Potyrailo et al. (U.S. Pat. No. 6,360,585 B1). Neither Martin et al. or Mansky teach the use of a one-port device. Potyrailo et al. teach the use of a one-port acoustic wave device, such as a thickness shear mode (TSM) device (see col. 6, lines 17 – 27). Potyrailo et al. teach that the resonator employed can be any type of device having vibration characteristics that vary based on a chemical in contact with the surface of the device. Potyrailo et al. teach that some transducers based on resonators are not always accurate or even useful for all chemical compounds (see col. 1, lines 28 – 48; col. 4, lines 26 – 39; col. 5, lines 55 – 65; col. 7, lines 30 – 47). The Courts have held that the prior art can be modified or combined



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to reject claims as *prima facie* obvious as long as there is a reasonable expectation of success. See *In re Merck & Co., Inc.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986) (see MPEP § 2143.02). Furthermore, a person of ordinary skill in the art would have recognized the suitability of incorporating a one-port acoustic wave device for the intended purpose of facilitating effective sensing operation utilizing an acoustic wave device, as evidenced by Potyrailo et al. (see MPEP § 2144.07). Hence, a person of ordinary skill in the art would logically select a particular sensing transducer or resonator, which would provide the best sensitivity based on the chemical system being studied (see MPEP § 2144.02). Therefore, it would have been obvious to one of ordinary skill in the art to incorporate a TSM device, as taught by Potyrailo et al., with the system, as taught by Martin et al. in view of Mansky, in order to provide an optimal sensing mechanism for the apparatus depending upon the response characteristics of the system under study. Regarding claim 31, Potyrailo et al. teach that incorporated TSM device operates at a frequency of 10 Mhz (see col. 6, lines 17 – 27).

3. Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Martin et al. in view of Mansky as applied to claims 1 – 3, 5 – 7, 10 – 17, 20 – 24, 28 – 30, 32 – 35 and 37 – 49 above, and further in view of Wauk, II (U.S. Pat. No. 3,818,379). Neither Martin et al. or Mansky teach the use of a non-piezoelectric acoustic wave device. Wauk, II does teach the use of a non-piezoelectric device, such as a cantilever device incorporating the use of non-piezoelectric ZnO (see col. 2, line 30 – col. 4, line 65). The Courts have held that the prior art can be modified or combined to reject claims as *prima facie* obvious as long as there is a reasonable expectation of success. See *In re Merck & Co., Inc.*, 800 F.2d 1091, 231 USPQ 375

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(Fed. Cir. 1986) (see MPEP § 2143.02). Furthermore, a person of ordinary skill in the art would have recognized the suitability of incorporating a non-piezoelectric acoustic wave device for the intended purpose of facilitating effective sensing operation utilizing an acoustic wave device, as evidenced by Wauk, II (see MPEP § 2144.07). Hence, a person of ordinary skill in the art would logically select a particular non-piezoelectric acoustic wave device, which would provide the best sensitivity based on the chemical system being studied (see MPEP § 2144.02). Therefore, it would have been obvious to one of ordinary skill in the art to employ a non-piezoelectric acoustic wave device in order to provide an optimal sensing mechanism for the apparatus depending upon the response characteristics of the system under study.

4. Claims 18, 19, 25, 26 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Martin et al. in view of Mansky as applied to claims 1 – 3, 5 – 7, 10 – 17, 20 – 24, 28 – 30, 32 – 35 and 37 – 49 above, and further in view of Gregorovich et al. (U.S. Pat. No. 6,284,311 B1). Regarding claims 18, 25 and 26, neither Martin et al. or Mansky teach the use of the screening system, as taught by Martin et al. in view of Mansky, for the screening of polyolefins for corrosion resistance. Gregorovich et al. do teach that polyolefins are useful in coating metal materials in order to provide chemical or corrosion resistance (see col. 1, lines 1 – 20; col. 3, lines 46 – 65). Regarding claims 19 and 36, it is well known in the art that water is a causative agent in the formation of corrosion on metal substrate surfaces (see MPEP § 2144.03). Additionally, the Courts have held that the prior art can be modified or combined to reject claims as *prima facie* obvious as long as there is a reasonable expectation of success. See *In re Merck & Co., Inc.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986) (see MPEP § 2143.02). Furthermore,

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a person of ordinary skill in the art would have recognized the suitability of utilizing such a screening system, as taught by Martin et al. in view of Mansky, for evaluating materials which are used for certain applications in which corrosion or chemical resistant properties are desirable, as shown by, for example, Gregorovich et al. (see MPEP § 2144.07). Therefore, it would have been obvious to one of ordinary skill in the art to employ the screening system, as taught by Martin et al. in view of Mansky, in the screening of polyolefin polymeric materials for corrosion resistance, as taught by Gregorovich et al., in order to evaluate polyolefin coating materials for chemical or corrosion resistant properties.

### ***Conclusion***

This is a continuation of applicant's earlier Application No. 09/681,431. All claims are drawn to the same invention claimed in the earlier application and could have been finally rejected on the grounds and art of record in the next Office action if they had been entered in the earlier application. Accordingly, **THIS ACTION IS MADE FINAL** even though it is a first action in this case. See MPEP § 706.07(b). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no, however,


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event will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian J. Sines, Ph.D. whose telephone number is (571) 272-1263. The examiner can normally be reached on Monday - Friday (11:30 AM - 8 PM EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill A. Warden can be reached on (571) 272-1267. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
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